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## **Pengembangan Kanal Fleksibel Berbahan Beton Memadat Mandiri Berserat Limbah Kaleng dan Limbah Plastik**

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### **ABSTRACT**

*The flexible duct is a flexible structure of building utility component for electricity and telephone cable network. This component is series of straight form duct module and junction with a flexible connector system. Duct alignment, both vertical and horizontal, is able to be adjust to limited space following the underground situation and its base position. The 1<sup>st</sup> batch of research grant has resulted an optimum mix design of self compacting concrete (SCC) combined with waste plastic fibre. Self compacting concrete is a modified viscous concrete that allow it to flow by its self weight in concrete framework without vibrator. The concrete mix design per one meter cubic concrete production comprises 400 kg Cement Portland, 1397 kg of aggregate with 40% of coarse aggregate and 60 % of fine aggregate, 0.5 % of plastic fibre, 80 kg of fly ash, 3,2 kg of superplasticizer (viscocrete) with 0.40 of water cement ratio. On fresh concrete test the SCC with plastic fibre recorded 720 mm diameter of slump flow, 3 second of  $t_{500}$ , 8 second of V-funnel pouring time, 5 second of  $t_{200}$ , 12 second of  $t_{400}$  and 0,96 of, self-leveling ratio ( $h_2/h_1$ ) by L-Box, perfect or 1 self-leveling ratio ( $h_2/h_1$ ) by U-box test. On hardened concrete properties this mixture recorded 33 MPa of compressive strength, 32711 MPa of elastic modulus. Early age shrinkage showed shrinkage delay time from  $t_0 = 146$  minutes to 194 minutes, 47 % the cumulative crack length reduction and 53% of crack width reduction compared to SCC without fibre. This SCC mix design is referred for mixing the row material of the flexible duct. The second batch of this research grant aims to design cable duct module, module junction and its connector device. The optimum dimension is determined from the criteria of hardened concrete surface appearance, compact appearance index, production cost and simplicity in installation. The optimum inter-straight module and the junction-module connecting system are chosen from three alternatives of connecting systems, those are bolt connector, metal bar connector and concrete connector. The result indicated that the optimum dimension of straight module is 600 mm length, 200 mm height, 200 mm width and 25 mm to 45 mm of the average thickness. There are four possibilities of connector system for the straight and junction module. The concrete simple connector was the easy system for installing and dismantling and a bit lower cost production, however it is less in bond connector strength. Meanwhile the connector system that combined with steel bolt component was quite strong in connecting the duct module, however its cost production was higher and need longer time for installation and dismantling.*